

58. The impeller of claim 38 wherein each of the three or more blades includes an angled surface.

59. The molten metal mixing device of claim 44 that is a scrap melter.

60. The molten metal mixing device of claim 44 wherein the drive shaft and the impeller are comprised of graphite.

{This Amendment, but showing changes relative to the previous version of the claims, is reproduced as Appendix A}

REMARKS

By this Amendment, Applicant cancels claims 19-24, 26-30, 49 and 51-52, and adds claims 53-60. Thus claims 25, 31-48, 50 and 53-60 are all the claims pending in the present application. Claims 31-44 and 47-48 and 50 stand rejected, claims 25, 31-37 are allowed and claims 45 and 46 are indicated to include allowable subject matter but were objected to as depending on a rejected base/intervening claim. Newly added claims 53-56 depend from allowed claim 25, newly added claims 57-58 depend from amended claim 38 and newly added claims 59-60 depend from amended claim 44. Reconsideration and allowance of all pending claims are respectfully requested in view of the following remarks.

I. ENTRY OF AMENDMENT AND ALLOWABLE SUBJECT MATTER.

By this Amendment, among other things, Applicant (i) addresses potential informalities of the pending claims, and (ii) amends certain claims into independent format to alleviate objections.

Applicant acknowledges that claims 25, 31-37 and 45-46 include allowable subject matter. Claim 44 has been amended to include the limitation that the fastener is positioned beneath the impeller, which Applicant believes distinguishes claim 44 over the prior art. Accordingly, the rejection of claim 44 is believed to be traversed. Claim 38 is also believed to be patentable since the prior art of record teaches cylindrical pares having a substantially uniform diameter from top to bottom.

II. CLAIM REJECTIONS.

A. 35 U.S.C. § 102(b)

Claims 19, 21, 23, 26, 27 and 51 were rejected under 35 U.S.C. § 102(b) as being anticipated by one or more references previously of record. By this Amendment, Applicant cancels these claims in order to advance the prosecution of this application. Notwithstanding, Applicant continues to assert that these claims are patentable over the cited art for all the reasons of record and reserves the right to pursue these cancelled claims in this application or a future continuation or reissue application.

B. 35 U.S.C. § 103(a)

Remaining claims 38-44, 47-48 and 50 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a combination of previously cited *Cooper* '045 or *Dube* in view of newly cited U.S. Patent 5,028,211 to Mordue et al. (hereinafter "*Mordue*")¹. Applicant respectfully traverses this rejection for the following reasons.

The Examiner alleges that *Cooper* '045 and/or *Dube* disclose all the aspects of these claims except for the provision that the connection of the impeller to the drive shaft is facilitated by a non-threaded tapered section. The Examiner relies on *Mordue* to make up for this deficiency alleging that *Mordue* discloses "the use of a non-threaded shaft and impeller section extending through the impeller, in which the section may take the form of a tapered bore." (10/4/02 Final Office Action pg. 8; emphasis added). The Examiner cites col. 4, lines 52-61 of *Mordue* in support of this proposition. Applicant respectfully submits the Examiner is mistaken.

Mordue discloses a pump 10 including an impeller 13 and a shaft 15. (Col. 3, ll. 38-45). *Mordue* also discloses openings 36 that are *aligned with the longitudinal axis of the shaft 15* and dowels 38 that are inserted therein to function as keys. (Col. 4, ll. 42-51). Contrary to the

¹ *Mordue* was not applied in the rejection of claims 47 and 48. However, as amended herein, claims 47 and 48 include the limitations of an impeller having a tapered non-threaded similar to claims 38-44.

Examiner's allegations, no taper on shaft 15 or in impeller 13 is shown, just corresponding openings 36 for receiving dowels 38. *Mordue* expressly discloses the use of a non-tapered cylindrical opening 28 in impeller 13. (Col. 4, ll. 53; Figs. 7-9).

In fact, *Mordue*'s closed type impeller 13 having a non-threaded cylindrical opening 28 is contrary to impeller 100 having a threaded aperture 101 disclosed by *Cooper* '045 (*Cooper* '045, Fig. 5), thus the references teach away from their suggested combination and also teach away from the claimed invention. Accordingly, the skilled artisan would not combine the references as described in the Examiner's rejection. And, even if the references would be combined, the resulting combination would not be an impeller having a non-threaded tapered bore. For these reasons, the Applicant submits that the §103 rejection based on the combination of *Cooper* '045 and *Mordue* is improper and should be withdrawn/

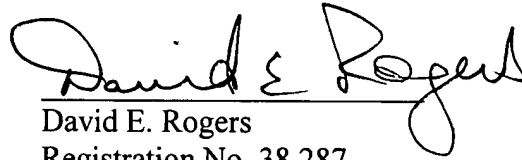
Moreover, *Dube* does not disclose any structure for removably connecting an impeller to a shaft. (See *Mordue* Fig. 1-6). There is simply no motivation to combine the fixed impeller/shaft structure disclosed by *Dube* with the removable impeller disclosed by *Mordue*. Consequently, any alleged combination of *Dube*'s blades 20 with *Mordue*'s impeller 13 is unsupported and, in any event, the combination would not disclose the claimed impeller having a non-threaded tapered bore.

III. CONCLUSION.

In view of the above, reconsideration is respectfully requested and allowance of this application is now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below. Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee or deficiency thereof, except for the Issue Fee, is to be charged to **Deposit Account No. 19-3878.**

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Respectfully submitted,

A handwritten signature in black ink, reading "David E. Rogers". The signature is fluid and cursive, with the first name "David" and last name "Rogers" clearly legible. The middle initial "E." is smaller and less distinct. The signature is written over a horizontal line.

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APPENDIX 1

Please cancel claims 19-24 and 26-30 without prejudice or disclaimer.

38. (Amended) An open impeller for circulating molten metal in a molten metal bath, the impeller comprising:

a hub;

three or more blades extending outwardly from said hub, there being spaces between the blades, wherein at least one of said three or more blades includes an angled surface for directing molten metal at least partially in a downward direction, and wherein at least one of said three or more blades includes a vertical surface for directing molten metal at least partially in a radially outward direction, [said rotor] the hub [further] including a non-threaded tapered bore for [connecting to] receiving an end of a drive shaft.

44. (Amended) A molten metal mixing device, the device comprising:

a drive source;

a drive shaft having a first end connected to the drive source and a second end;

an impeller for mixing molten metal, the impeller comprising two or more blades and a [non-threaded tapered bored] bore for receiving the second end of the drive shaft; and

a fastener to secure the second end to the [non-threaded tapered bore] impeller,
the fastener connected to the second end of the drive shaft and positioned beneath the impeller.

47. (Amended) A device for generating a downward stream of molten metal, the device comprising:

a drive source;

a drive shaft having a first end connected to the drive source and a second end;

and

an open impeller having a plurality of outward extending blades wherein each of the plurality of blades has a portion that directs molten metal at least partially downward, and each

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of the blades has a height and a width, the height being less than four times the width, and wherein the impeller further includes a tapered, non-threaded bore extending therethrough.

48. (Amended) The device of claim [48] 47 wherein the portion is an angled surface.

Please cancel claims 49 and 51-52 without prejudice or disclaimer.

Please add the following claims:

53. The drive shaft of claim 35 wherein the shaft is comprised of graphite.

54. The drive shaft of claim 25 wherein the first end of the shaft is connected to a coupling.

55. The drive shaft of claim 25 wherein the threaded portion has 4" - 4½" U.N.C. threads.

56. The drive shaft of claim 25 wherein the threaded portion is positioned entirely beneath the impeller when the drive shaft is connected to the impeller.

57. The impeller of claim 38 wherein the impeller is comprised of graphite.

58. The impeller of claim 38 wherein each of the three or more blades includes an angled surface.

59. The molten metal mixing device of claim 44 that is a scrap melter.

60. The molten metal mixing device of claim 44 wherein the drive shaft and the impeller are comprised of graphite.